COURSE OVERVIEW ME0217-3D
Turbine: Major Inspection & Overhaul

Course Title
Turbine: Major Inspection & Overhaul

Course Date/Venue
November 04-06, 2024/ Boardroom 1, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE

1.8 CEUs (18 PDHs) AWARD

Course Reference
ME0217-3D

H-STK© INCLUDED

Course Duration/Credits
Three days/1.8 CEUs/18 PDHs

Course Description

This practical and highly-interactive course includes various practical sessions and exercises. Theory learnt will be applied using our state-of-the-art simulators.

This course is designed to provide delegates with a detailed and up-to-date knowledge on turbine overhauling. It covers gas and steam turbines including their design and construction range; maintenance and overhaul considerations; proper maintenance, overhaul differences and the needs for internal, external turbine parts and supporting systems; major turbine components; major external components and supporting systems; turbine component characteristics; failure mechanisms; equipment monitoring; operations and training infrastructure; and steam turbine availability.

At the completion of the course, participants will be able to carry out scheduled maintenance and overhaul practices; inspect combustion; apply risk based methodologies, reliability centered or condition based maintenance; identify the issues with the new steam turbine technologies and applications; recognize associate jobs with overhaul and inspections; repair strategy optimization for gas turbine based on equivalent operating hour (EOH) analysis; and perform and maintain continuous improvement of gas turbines.

Course Objectives

Upon the successful completion of this course, each participant will be able to:-

- Apply systematic techniques on turbine overhauling
- Describe gas and steam turbines including their design and construction range
- Discuss maintenance and overhaul considerations covering steam turbine design/construction, arrangements, application and industry, gas quality, steam quality, plant infrastructure from monitoring, operations and maintenance
- Recognize the proper maintenance, overhaul differences and the needs for internal, external turbine parts and supporting systems
- Identify major turbine components comprising of steam/gas, major internal components, rotating blading and discs, shafts, rotors, bearings and seals, stationary blading and diagrams, shells, blade rings and casings
- Enumerate the major external components and supporting systems
- Describe turbine component characteristics and failure mechanisms
- Implement equipment monitoring, operations and training infrastructure
- Identify and maintain steam turbine availability and share failure experience
- Determine steam turbine availability and failure experience
- Carryout scheduled maintenance and overhaul practices as well as the annual and multiple year steam turbine maintenance frequencies and task
- Inspect combustion and discuss the approaches, methodologies and criteria for establishing longer time intervals between major overhauls as well as management directed intervals, process and criticality driven intervals and turbine manufacturer driven intervals
- Discuss risk based methodologies, reliability centered or condition based maintenance
- Identify the issues with the new steam turbine technologies and applications
- Issue tender documents for major overhaul and inspect gas turbines
- Recognize associate jobs with overhaul and inspections and repair strategy optimization for gas turbine based on equivalent operating hour (EOH) analysis
- Perform and maintain continuous improvement of gas turbines

Exclusive Smart Training Kit - H-STK®

*Participants of this course will receive the exclusive "Haward Smart Training Kit" (**H-STK®**). The **H-STK®** consists of a comprehensive set of technical content which includes **electronic version** of the course materials, sample video clips of the instructor's actual lectures & practical sessions during the course conveniently saved in a **Tablet PC**.*

Who Should Attend

This course covers systematic techniques and methodologies on turbine overhauling for mechanical engineers, supervisors, foremen, team leaders, plant operators and other technical staff who are responsible for the day-to-day operations of a gas turbine. Maintenance personnel who are involved in the troubleshooting of operational problems will also find this course extremely useful.

Training Methodology

All our Courses are including **Hands-on Practical Sessions** using equipment, State-of-the-Art Simulators, Drawings, Case Studies, Videos and Exercises. The courses include the following training methodologies as a percentage of the total tuition hours:-

30% Lectures
20% Practical Workshops & Work Presentations
30% Hands-on Practical Exercises & Case Studies
20% Simulators (Hardware & Software) & Videos

In an unlikely event, the course instructor may modify the above training methodology before or during the course for technical reasons.

Course Fee

US$ 3,750 per Delegate + **VAT**. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Accommodation

Accommodation is not included in the course fees. However, any accommodation required can be arranged at the time of booking.

Course Certificate

Internationally recognized certificates will be issued to all participants of the course who completed a minimum of 80% of the total tuition hours.

Certificate Accreditations

Certificates are accredited by the following international accreditation organizations: -

- The International Accreditors for Continuing Education and Training (IACET - USA)

  Haward Technology is an Authorized Training Provider by the International Accreditors for Continuing Education and Training (IACET), 2201 Cooperative Way, Suite 600, Herndon, VA 20171, USA. In obtaining this authority, Haward Technology has demonstrated that it complies with the **ANSI/IACET 2018-1 Standard** which is widely recognized as the standard of good practice internationally. As a result of our Authorized Provider membership status, Haward Technology is authorized to offer IACET CEUs for its programs that qualify under the **ANSI/IACET 2018-1 Standard**.

  Haward Technology's courses meet the professional certification and continuing education requirements for participants seeking **Continuing Education Units** (CEUs) in accordance with the rules & regulations of the International Accreditors for Continuing Education & Training (IACET). IACET is an international authority that evaluates programs according to strict, research-based criteria and guidelines. The CEU is an internationally accepted uniform unit of measurement in qualified courses of continuing education.

  Haward Technology Middle East will award **1.8 CEUs** (Continuing Education Units) or **18 PDHs** (Professional Development Hours) for participants who completed the total tuition hours of this program. One CEU is equivalent to ten Professional Development Hours (PDHs) or ten contact hours of the participation in and completion of Haward Technology programs. A permanent record of a participant's involvement and awarding of CEU will be maintained by Haward Technology. Haward Technology will provide a copy of the participant's CEU and PDH Transcript of Records upon request.

- British Accreditation Council (BAC)

  Haward Technology is accredited by the **British Accreditation Council** for **Independent Further and Higher Education** as an **International Centre**. BAC is the British accrediting body responsible for setting standards within independent further and higher education sector in the UK and overseas. As a BAC-accredited international centre, Haward Technology meets all of the international higher education criteria and standards set by BAC.

Course Instructor

This course will be conducted by the following instructor. However, we have the right to change the course instructor prior to the course date and inform participants accordingly:

Mr. Mohamed Refaat, MSc, BSc, is a **Senior Mechanical & Maintenance Engineer** with almost **30 years** of extensive experience in **Rotating Equipment** and **Machinery** including **Pumps**, **Compressors**, **Turbines**, **Motors**, **Turbo-expanders**, **Gears**, etc. His wide experience also covers **Centrifugal Compressor & Steam Turbine**, **Centrifugal Pump**, **Pump** Technology, **Gas Turbine** Technology, **Heat Exchanger**, **Turbines & Motors**, **Variable Speed Drives**, **Seals**, **Control Valves**, Advanced **Valve** Technology, **Dry Seal**, **Fired Heaters**, **Air Coolers**, **Crude Desalter**, **Process Vessels & Valves**, **Industrial Equipment & Rotating Machinery**, **Mechanical** Engineering, **Mechanical Equipment & Turbomachinery**, **Piping**, **Pipelines**, **Valves**, **Lubrication Technology**, **Vibration Analysis**, **Power System Hydraulics**, **Security Detection** Systems & Operation, **Process Plant** Equipment, Troubleshooting **Process Operations**, **Maintenance Management** Best Practices, **Rotating Equipment** Reliability Optimization, Practical **Machinery Vibration**, **Vibration** Techniques, Effective **Reliability Maintenance**, Excellence in **Maintenance & Reliability** Management, **Preventive & Predictive Maintenance**, Machinery Failure Analysis (**RCFA**), **Reliability** Optimization & Continuous Improvement, **Maintenance** Planning, Scheduling & Work Control, **Maintenance Management** Strategy, **Mechanical & Rotating Equipment** Troubleshooting, Preventive Maintenance, Predictive Maintenance, Reliability Centered Maintenance (**RCM**), Condition Based Monitoring (**CBM**), **FMEA** and Troubleshooting of machinery and rotating equipment including turbines, bearings, compressors, pumps etc. He is currently the **Mechanical Maintenance Section Head** of the **Arab Petroleum Pipelines Company** where he is in charge of planning, scheduling & managing the execution of preventive & corrective mechanical maintenance activities for all equipment. He is responsible for executing the scheduled inspections & major overhauls for gas turbines, valves & pumps, carrying out off-line vibration monitoring plans, troubleshooting, fault diagnosing & investigating failures of machinery.

During his career life, Mr. Mohamed was able to modify the gas turbines self cleansing system to improve its maintainability and extend the air filters' lifetime. He was responsible for defining & updating the equipment codes and parameters for replacing the old **CMMS** with **MAXIMO**. He also worked as the Operations Supervisor wherein he was closely involved with the operation of the crude oil internal **pipeline** system between the tankers and tank farm, operation & control of the booster pumps for pumping crude oil for main pipelines and the development & implementation of the plans & procedures for draining the main terminal internal lines for maintenance purposes. He also held the position of Measurement Engineer where he was responsible for the crude oil custody transfer, performing loss control analysis and operating the crude oil automatic sampler & related equipment. Prior to that, he was the Design Engineer responsible for the design phase of the Truck Mixer Manufacturing Project of the Mechanical Design Department.

Mr. Refaat has **Master** and **Bachelor** degrees in **Mechanical Engineering** and a General Certificate of Education (**GCE**) from the **University of London**, **UK**. Further, he is a **Certified Instructor/Trainer**, a **Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership & Management** (**ILM**) and a member of the Engineering Syndicate of Egypt. He has further delivered numerous training, courses, workshops, seminars and conferences worldwide.

Course Program

The following program is planned for this course. However, the course instructor may modify this program before or during the course for technical reasons with no prior notice to participants. Nevertheless, the course objectives will always be met:

Day 1: ***Monday 04th of November 2024***

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0900	***Introduction*** *Gas & Steam Turbines ● Design & Construction Range*
0900 - 0930	***Maintenance & Overhaul Considerations*** *Steam Turbine Design/Construction ● Arrangements ● Application & Industry ● Gas Quality ● Steam Quality ● Plant Infrastructure from Monitoring ● Operations & Maintenance*
0930 – 0945	*Break*
0945 – 1100	***Maintenance, Overhaul Differences & Needs for Internal & External Turbine Parts & Supporting Systems***
1100 – 1130	***Major Turbine Components*** *Steam/Gas ● Major Internal Components ● Rotating Blading & Discs ● Shafts ● Rotors ● Bearings & Seals ● Stationary Blading & Diagrams ● Shells ● Blade Rings & Casings*
1130 - 1215	***Major External Components/Supporting Systems*** *Main Stop ● Trip & Throttle ● Intercept Valves ● Governor/Control Valves ● Admission ● Extraction, Steam & Drain Connections ● Overspeed Connection System ● Lubrication System ● Electrohydraulic System ● Water/Steam Chemistry Controls ● Turbine Control System ● Compressor*
1215 – 1230	*Break*
1230 – 1300	***Turbine Component Characteristics & Failure Mechanisms*** *Detectable Problems ● Gas Path Analysis ● Turbine Blade Distress ● Compressor Fouling ● Combustor Distress & Plugged Fuel Nozzles ● Foreign/Domestic Object Damage ● Worn Air/Oil Seals ● Fuel Control Problems*
1300 - 1330	***Equipment Monitoring*** *Water & Steam Purity Monitoring ● Water Induction Monitoring ● Condition Monitoring ● Management*
1330 - 1420	***Operations & Training Infrastructure***
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today & Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day One*

Day 2: ***Tuesday 05th of November 2024***

0730 – 0830	***Steam Turbine Availability & Failure Experience***
0830 - 0930	***Scheduled Maintenance & Overhaul Practices (US, European, Japanese)***
0930 – 0945	*Break*
0945 – 1100	***Annual Steam Turbine Maintenance Frequencies & Tasks (US, European, Japanese)***

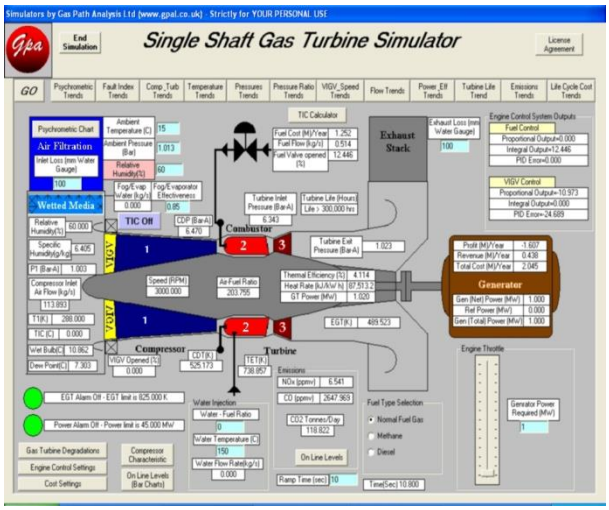
1100 – 1130	***Multiple-Year Steam Turbine Maintenance Frequencies & Tasks (US, European, Japanese)***
1130 - 1215	***Combustion Inspection*** *Removing the Parts ● Turbine Compartment ● Opening the Combustion Cans ● Re-Installation of the Parts*
1215 – 1230	*Break*
1230 – 1300	***Case Studies*** *Gas Turbine Inspection ● Inspection Frequency ● Combustion Inspection ● Hot/Gas Path Inspection ● Major Inspection*
1300 - 1330	***Approaches/Methodologies/Criteria for Establishing Longer Time Intervals between Major Overhauls***
1330 - 1420	***Management Directed Intervals***
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today & Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Two*

Day 3: ***Wednesday 06th of November 2024***

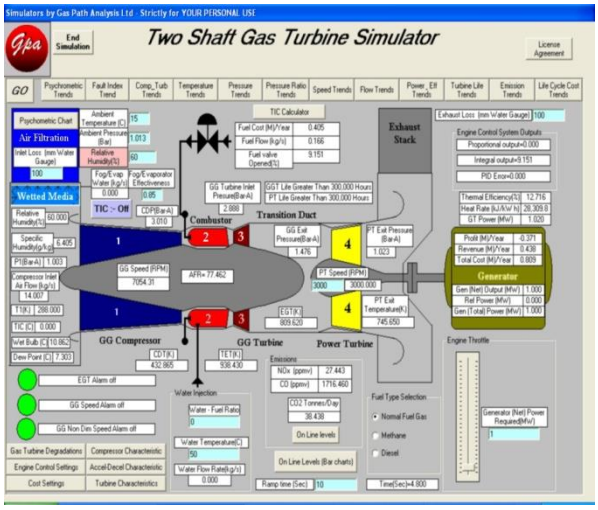
0730 – 0830	***Process & Criticality Driven Intervals***
0830 – 0930	***Turbine Manufacturer's Intervals***
0930 – 0945	*Break*
0945 – 1100	***Risk-Based Methodologies***
1100 – 1130	***Reliability Centered or Condition Based Maintenance***
1130 - 1215	***Issues with New Steam Turbine Technologies & Applications***
1215 – 1230	*Break*
1230 – 1300	***Tender Documents for Major Overhaul, Inspection Gas Turbines & Other***
1300 - 1330	***Associated Jobs with Overhaul & Inspections, Repair Strategy Optimization for Gas Turbine Based on Equivalent Operating Hour (EOH) Analysis***
1330 - 1345	***Gas Turbines Performance & Maintenance Continuous Improvement***
1345 – 1400	***Course Conclusion*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Course Topics that were Covered During the Course*
1400 – 1415	***POST-TEST***
1415 – 1430	*Presentation of Course Certificates*
1430	*Lunch & End of Course*

Simulator (Hands-on Practical Sessions)

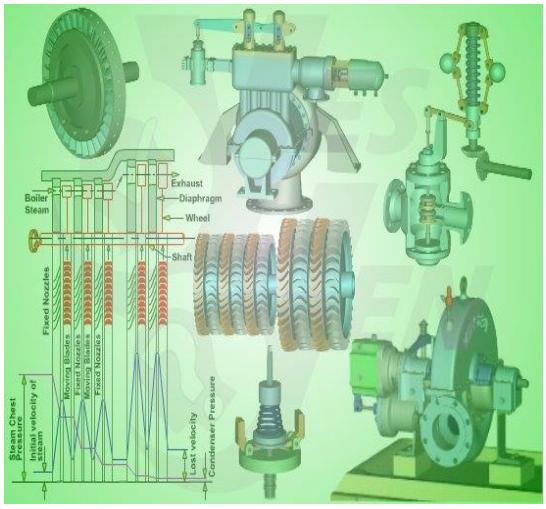
Practical session will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using the "Single Shaft Gas Turbine Simulator", "Two Shaft Gas Turbine Simulator", and "Steam Turbines & Governing System CBT".



Single Shaft Gas Turbine Simulator



Two Shaft Gas Turbine Simulator



Steam Turbines & Governing System CBT

Course Coordinator

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